


Condor Week 2007

Glidein Factories

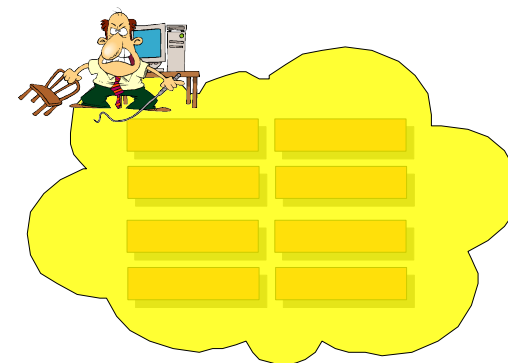
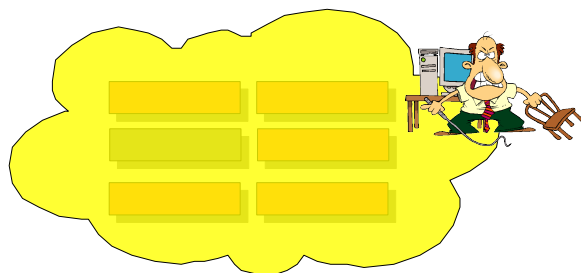
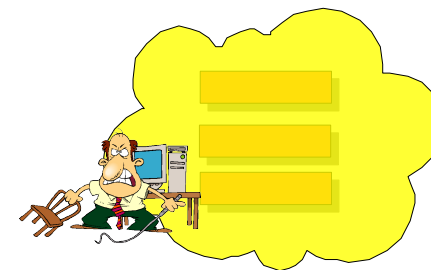
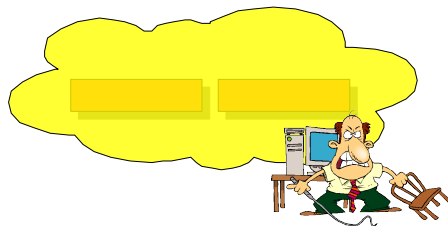
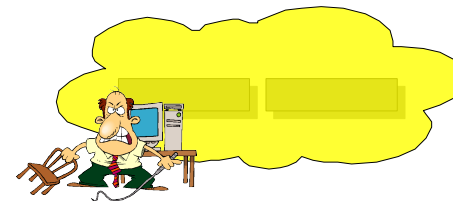
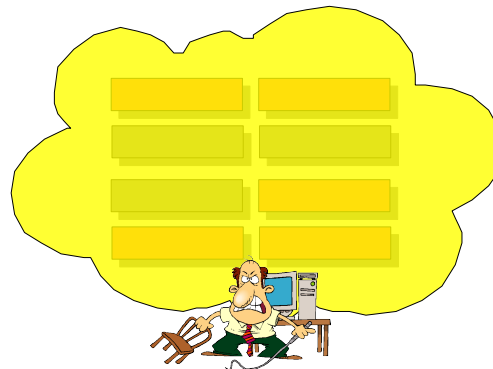
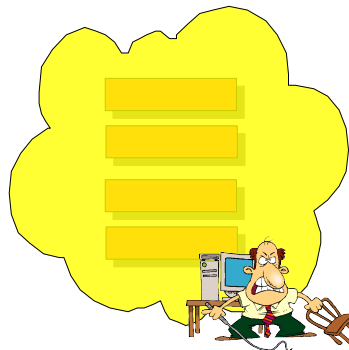
(and in particular, the glideinWMS)

by Igor Sfiligoi

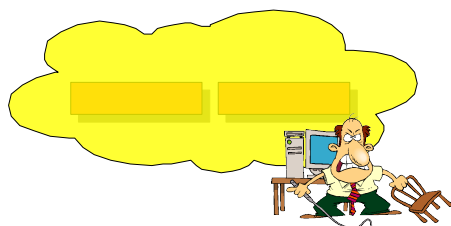
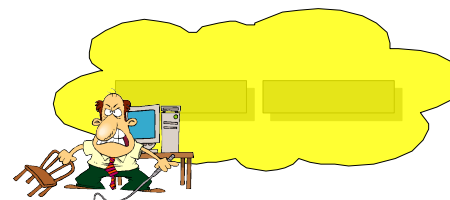
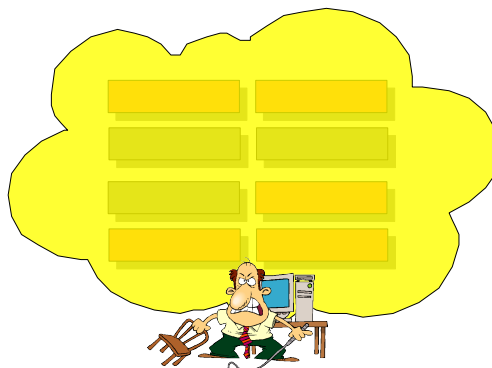
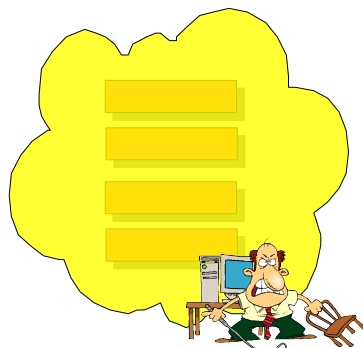
Anybody heard of “**The Grid**”?

- “**The Grid**” is the current way forward in most sciences
 - Certainly in High Energy Physics (and in particular CMS)
- “**The Grid**” is the sum of “**Grid Sites**”, each offering a moderate amount of (mostly) computing resources
 - Each site has a standard “**Gatekeeper**”,  responsible for regulating access to the site
(How the “**Gatekeeper**” handles the computing resources, is anyone's guess)

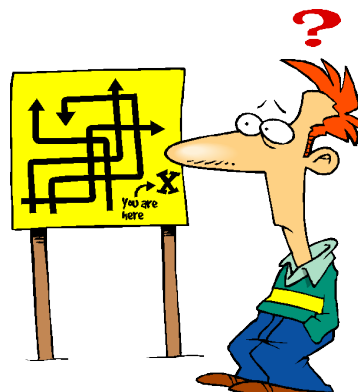
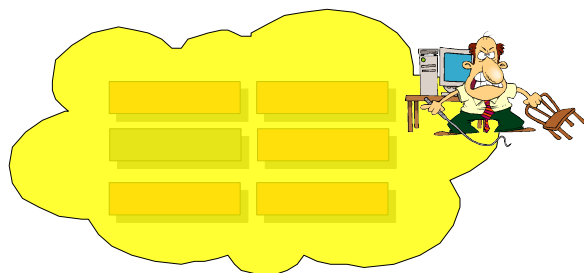
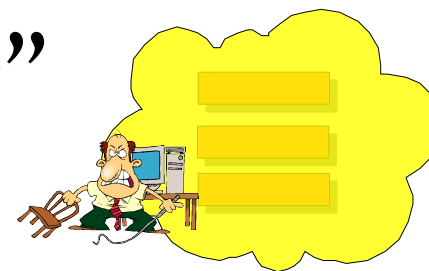
Dear public, “The Grid”



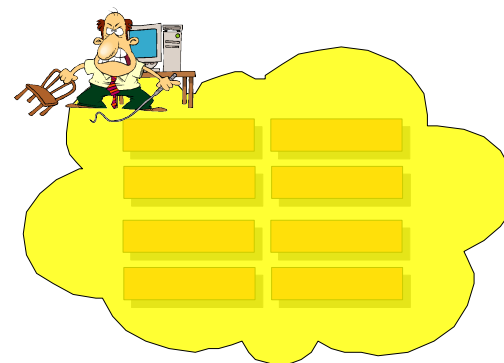
Dear public, “The Grid”



And “The User”

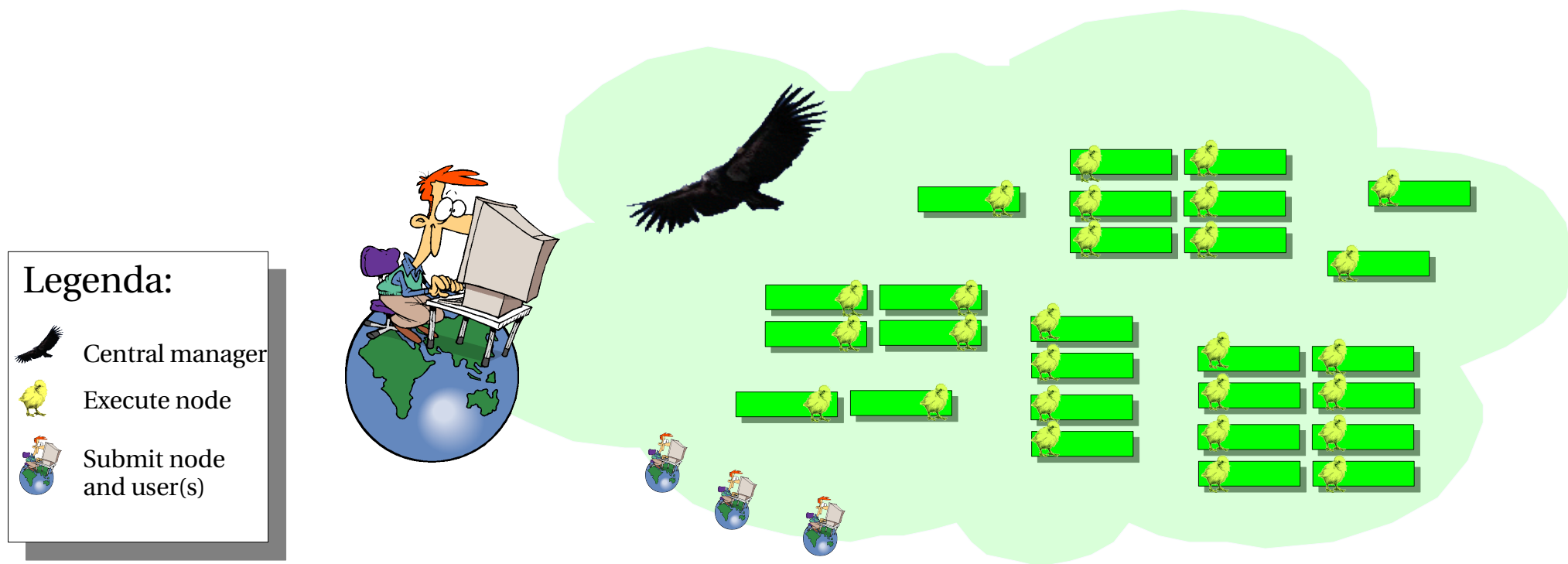


“The Grid” is not an easy place to live in!

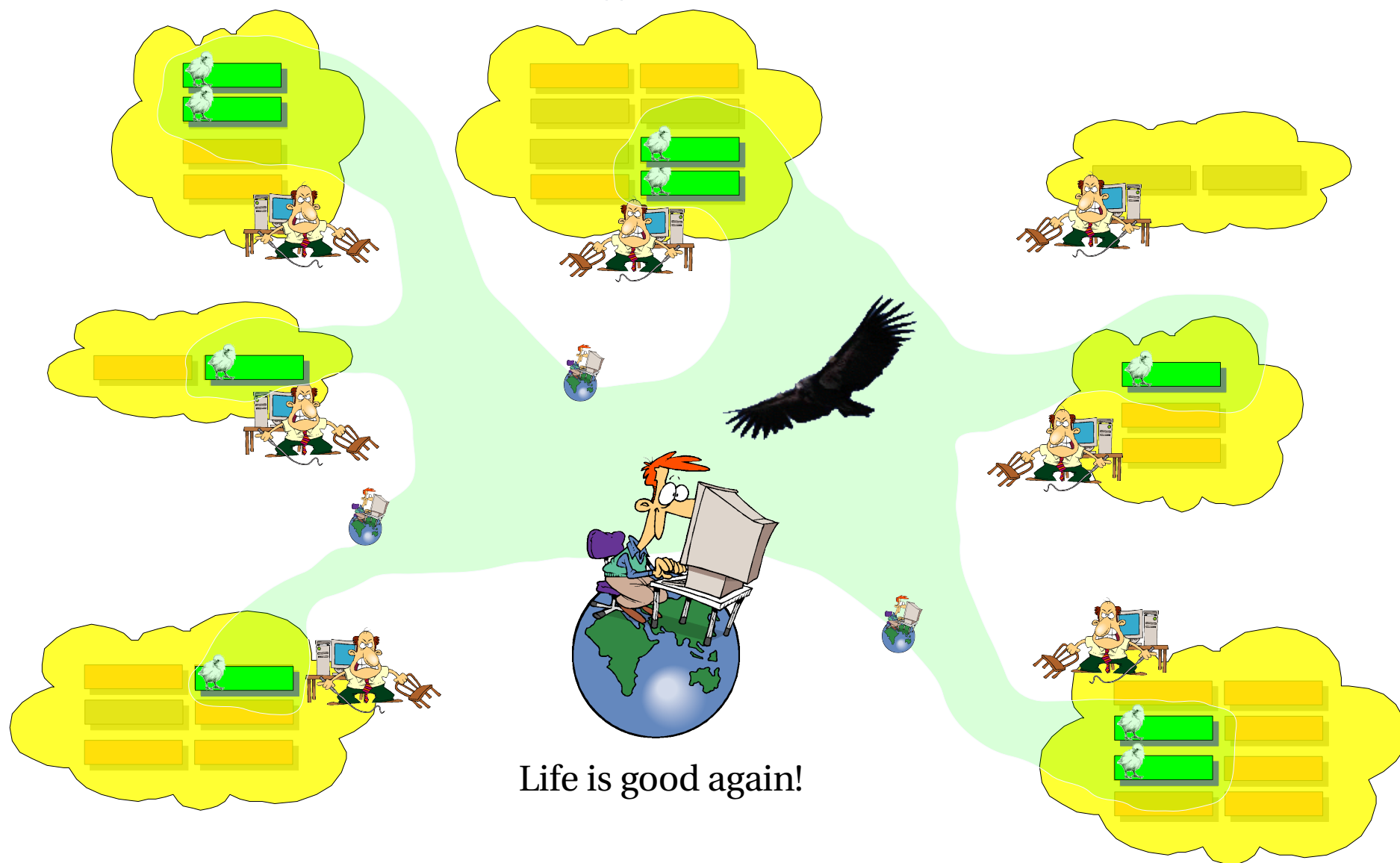


Compare this to **Condor**

- A single system from the user point of view
 - User submits to a local scheduler
 - Condor does all the magic



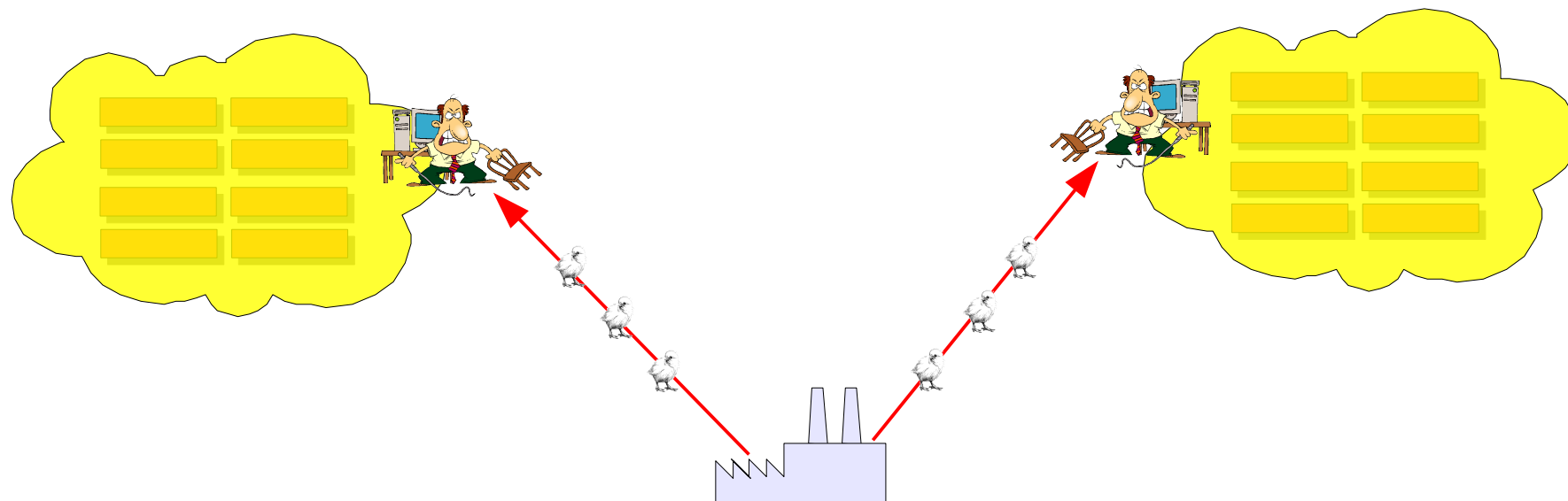
So let **Condor** manage “**The Grid**”!








So let **Condor** manage “**The Grid**”!



The answer: Condor glide-ins

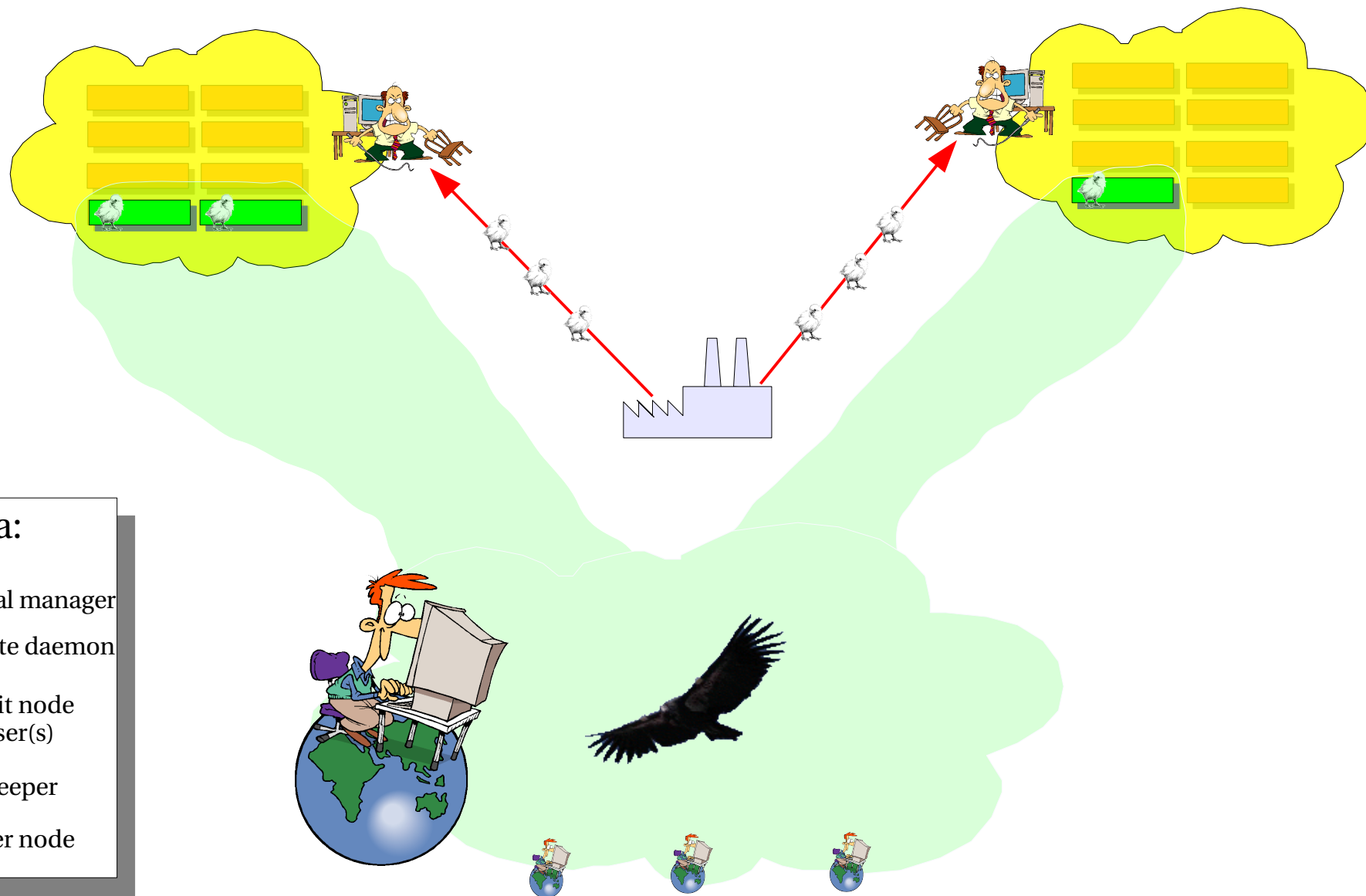


Legenda:






-  Central manager
-  Execute daemon
-  Submit node and user(s)
-  Gatekeeper
-  Worker node



The answer: Condor glide-ins



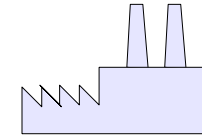
Legenda:

-  Central manager
-  Execute daemon
-  Submit node and user(s)
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What exactly is “**a glidein**”?

- “**A glidein**” is just a regular **condor_startd** daemon, submitted as **a Grid job**
- The glidein-Grid job needs to:
 - validate the worker node (for example against memory and disk problems)
 - discover or fetch the condor binaries
 - configure the Condor daemons
 - start the Condor daemons
- For simple use-cases, you can use **condor_glidein**

The glidein factory



- Needs to know how to submit to the “**Grid Sites**”
 - ... how to obtain the list of sites
 - For each site:
 - how to talk to the “**Gatekeeper**”
 - what is the configuration of the site (network, security, software, etc.)
- Needs to know when to submit new glideins
 - **Resources not used by my pool could be used by others**
 - Submit only if users need more resources (modulo speculative submissions)
 - Submit only to sites who declare that can run at least a subset of user jobs

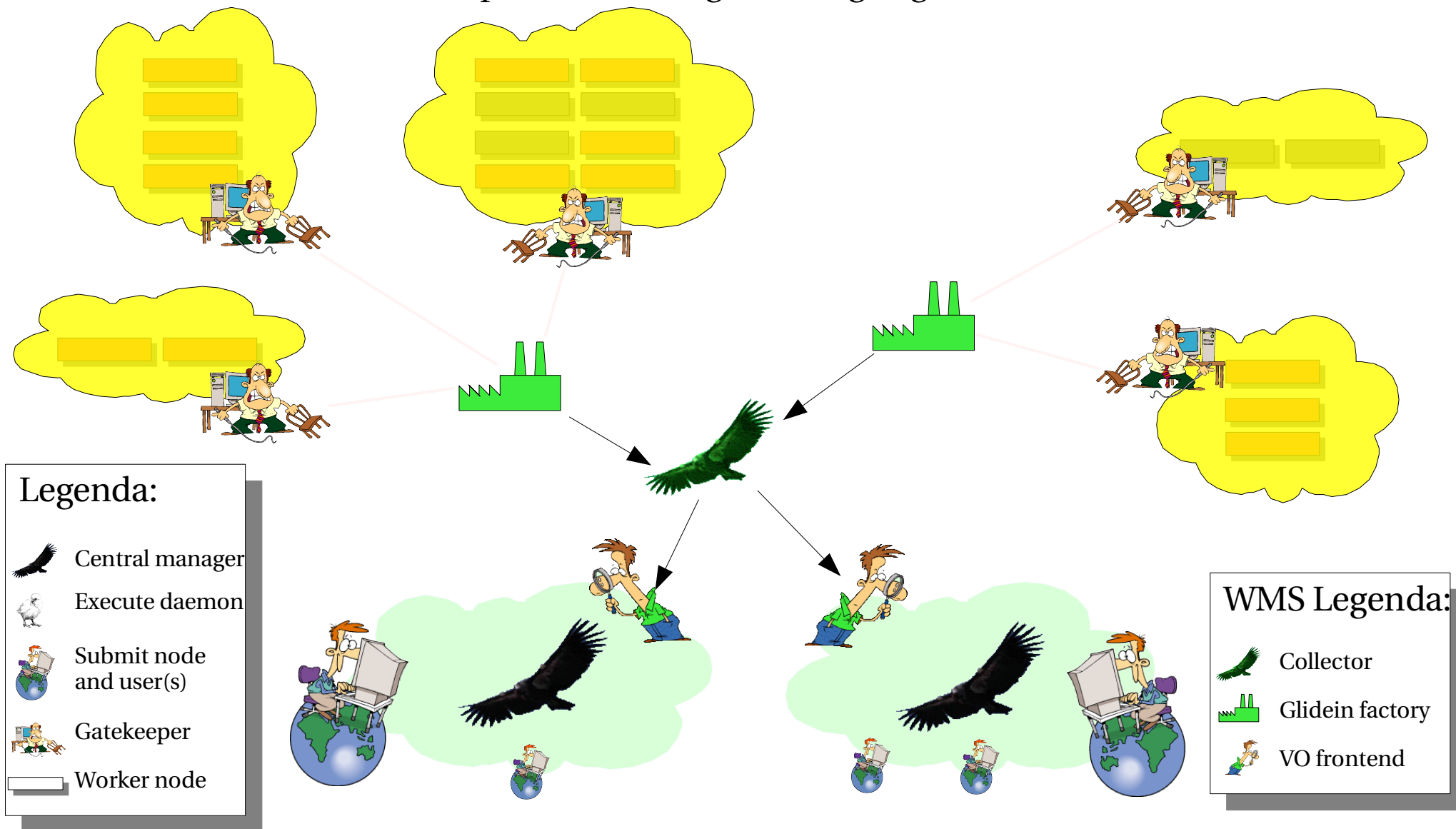
The **glidein**WMS

<http://home.fnal.gov/~sfiligoi/glideinWMS/>

- A glidein-based Workload Management System (WMS) developed for USCMS
 - Derived from the CDF GlideCAF (Presented at CondorWeek2006)
 - But meant to be generic enough to support different communities
- Uses the **dividi-et-impera** approach
 - Glidein Factories know how to submit to the **Grid Sites**
 - VO Frontends monitor jobs and direct the factories
- **Condor Collector** used for message passing

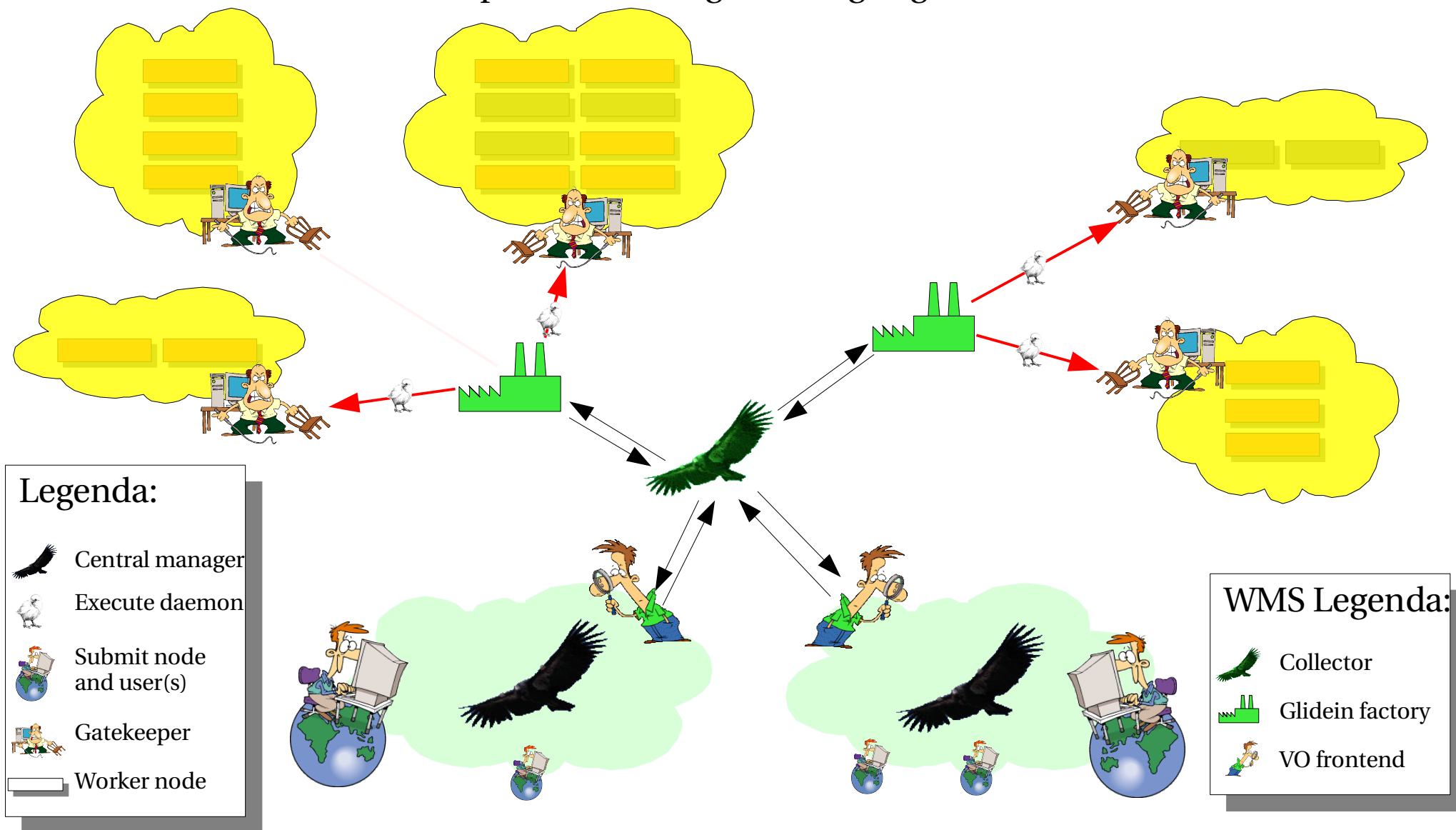
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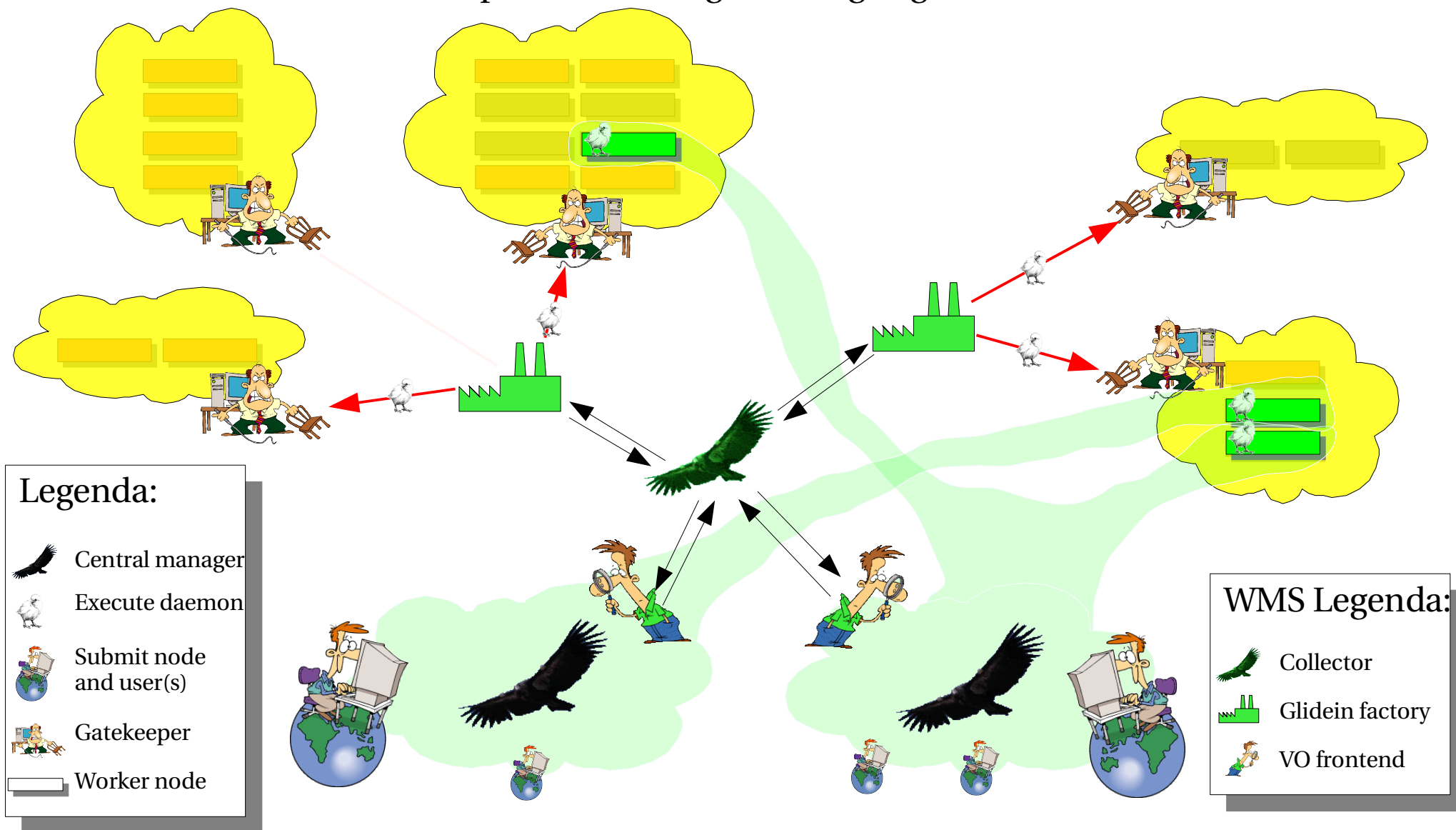
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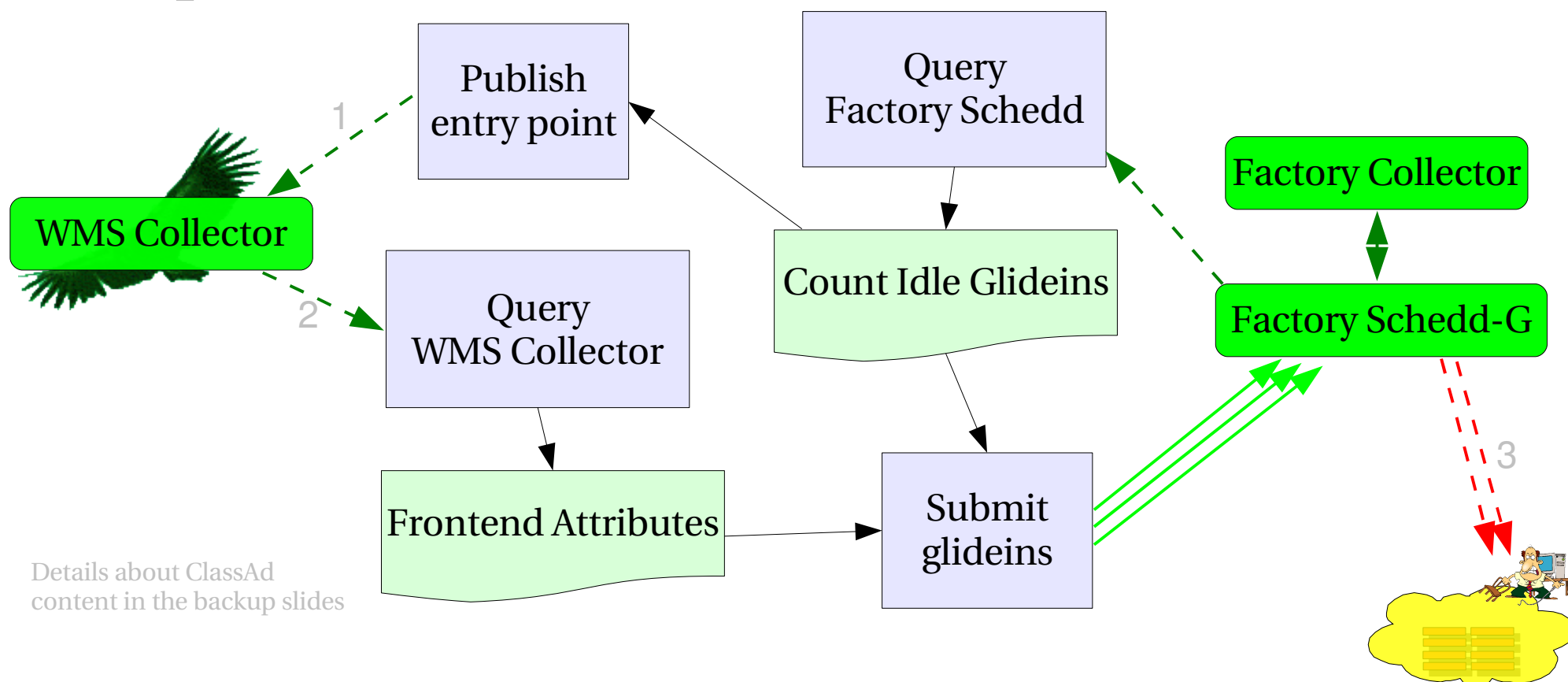
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glideinWMS internals

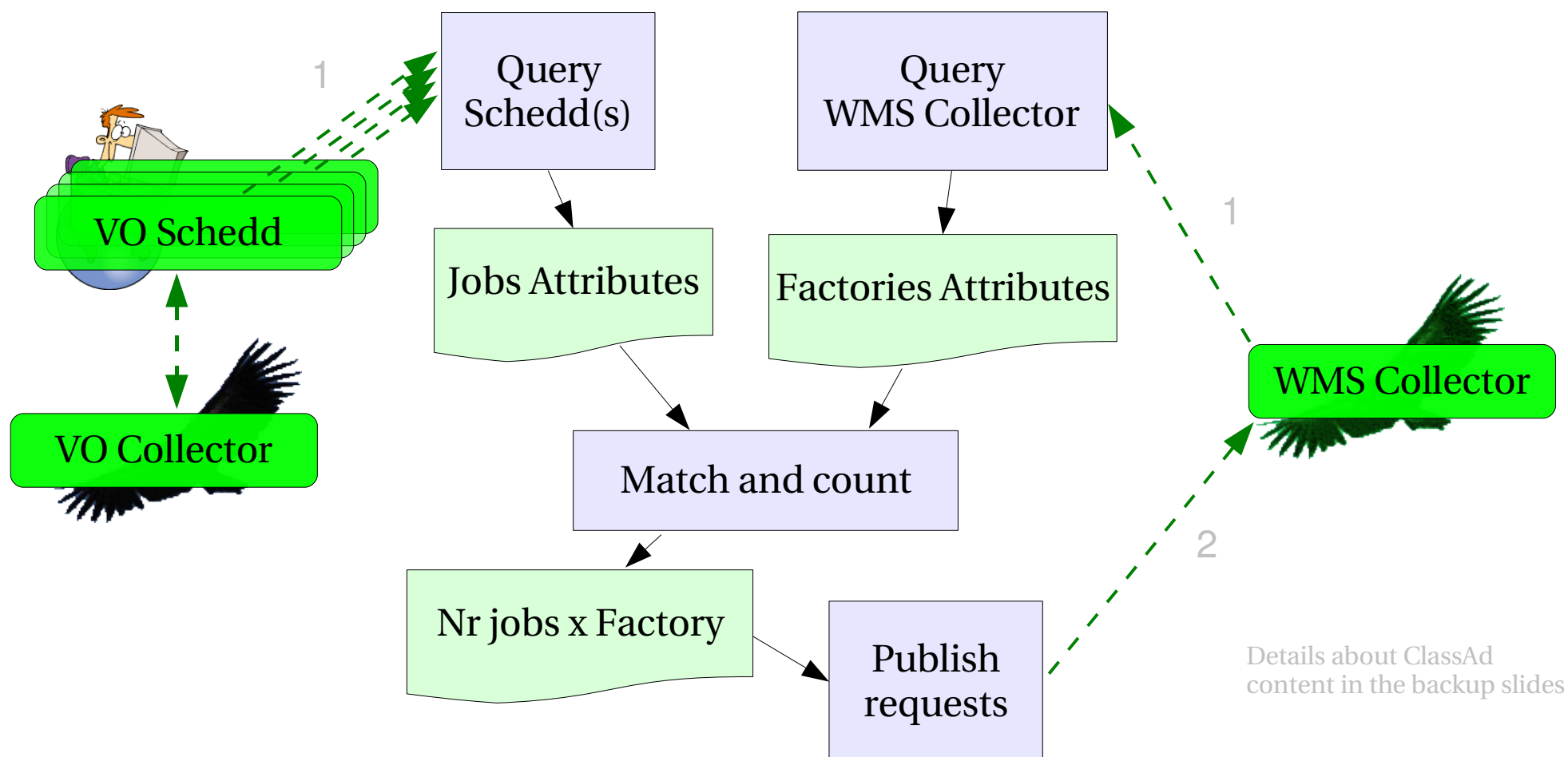
- Glidein Factory essentially a publish-read-submit loop



glideinWMS internals



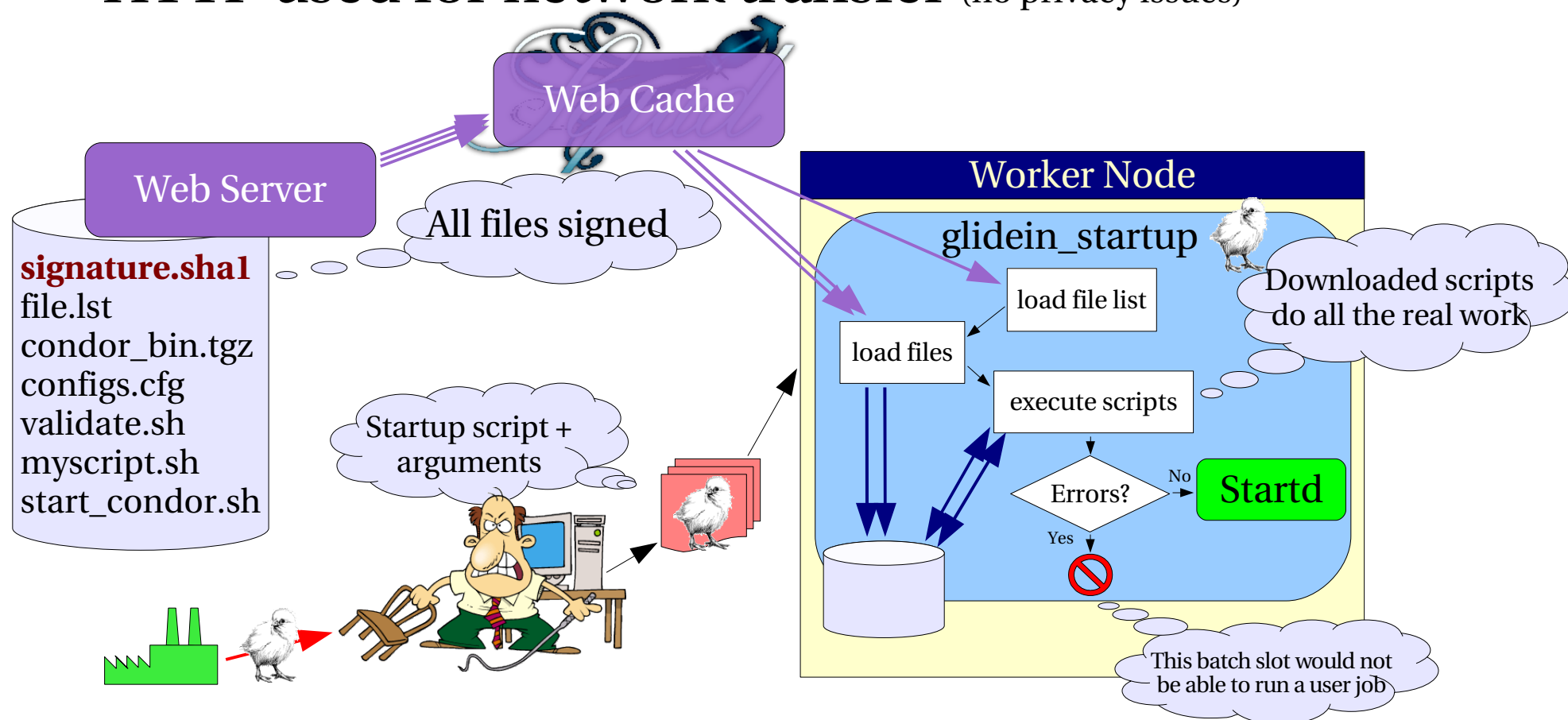
- VO Frontend acts as a matchmaker



glideinWMS internals



- Glidein startup script simply loads other scripts
 - HTTP used for network transfer (no privacy issues)



Network security concerns

- Traffic on WAN insecure by definition
- Using x509 (GSI) service proxies for authentication
 - **Condor tools** securing communication between
 - VO Frontend  and Glidein Factory 
 - Startd  and Collector/Schedd 
 - **Condor** supports strong authentication, integrity checks and encryption for privacy
- HTTP-accessed data checked via SHA1 checksums

Working over Firewalls



- **Condor** is based on the peer-to-peer principle
 - Needs two-way network traffic
- Most **Grid Sites** behind firewalls
 - Most have only outgoing connectivity
 - Some only proxied traffic
- **Condor GCB** must be used with such sites
 - See GCB talk for more details







Security on the Worker Nodes

- Glide-in **Condor** not running as a privileged user
 - Cannot change UID without help from the system
 - **Condor daemons not protected from user jobs**
- **Open Science Grid (OSG)** starting to deploy gLExec on its worker nodes
 - A x509-based Apache-suexec derivative
 - **Condor** can use the service proxy to run the user job under a different UID
 - **Same security as if Condor running as root**



Conclusion



- **“The Grid”**  has a lot of resources (even for free)
 - Why not use them?
- **Glideins**  allow you to use those resources without a single change in your jobs 
 - You can even submit standard universe jobs!
- **glideinWMS**  can help you automatize the maintenance of a glidein pool
 - Let me know if you are interested
 sfiligoi@fnal.gov
<http://home.fnal.gov/~sfiligoi/glideinWMS/>

Glidein Factories

Backup slides

VO Frontend ClassAd



Due to Condor limitations,
define also GlideinMyType

Target a specific Entry Point

Request a steady stream
of glideins starting

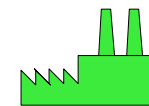
Customize the submitted glideins.
GlideParamXXX must match the names
published by the factory

Monitoring data like:
Idle="546", Running="222"

Published classad

```
MyType="glideclient"
Name="reqX@client"
ClientName="client"
ReqName="reqX"
ReqGlidein="entry@factory"
ReqIdleGlideins=nr
ReqMaxRun=nr
ReqMaxSubmitXHour=nr
GlideinParamWWW="val1"
...
GlideinParamZZZ="valY"
GlideinMonitorNNN="valN"
...
GlideinMonitorMMM="valM"
```


Glidein Factory ClassAd



Published classad

```
MyType="glidefactory"
Name="entry@factory"
FactoryName="factory"
GlideinName="entry"
Attribute1="..."
...
AttributeN="..."
GlideinParamXXX="val1"
...
GlideinParamYYY="valZ"
GlideinMonitorNNN="valN"
...
GlideinMonitorMMM="valM"
```

Due to Condor limitations,
define also GlideinMyType

Attributes that describe the glidein like:
ARCH="INTEL", MaxHours=72, Site="Florida"

Parameters set glidein parameter defaults like:
CONDOR_HOST="UNDEFINED", SEC_DEFAULT_ENCRYPTION=OPTIONAL
MinDisk=16G, CheckFilesExist="/tmp/CMS,\$DATA/OSG"

Monitoring data like:
TotalStatusIdle="234", TotalStatusRunning="1356"
TotalRequestedIdle="50"

Glidein details

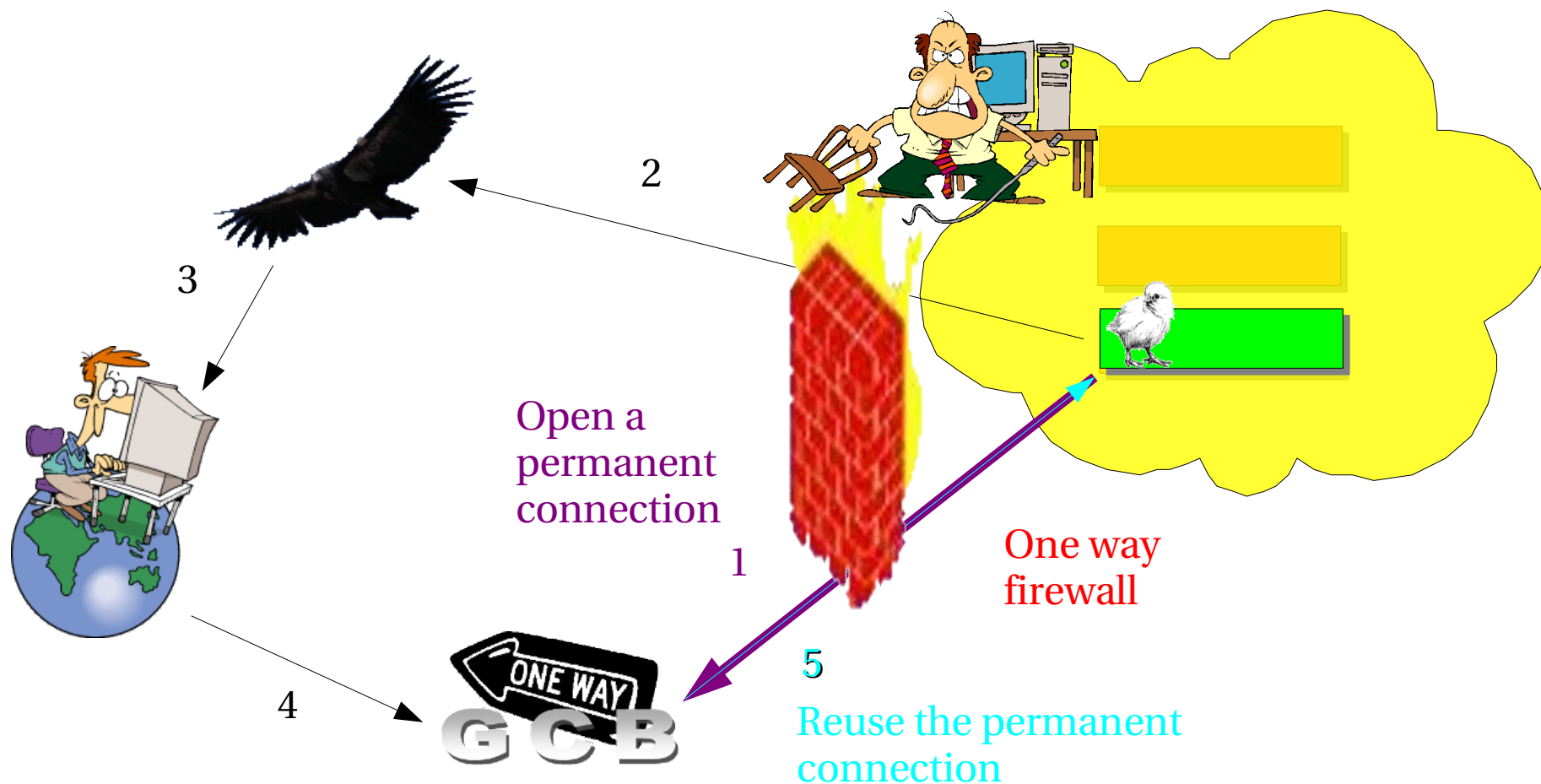
- Dummy startup script
 - Just loads other files and execute the ones marked as executable
- File transfer implemented using HTTP
 - Easy cacheable, standard tools available (Squid)
 - Proven to scale, widely used in Industry
- All sensitive file transfers signed (SHA1)
 - Prevent tampering, as HTTP travels in clear

Glidein details




- Standard sanity checks provided
 - Disk space constraints
 - Node blacklisting
- Generic Condor configure and startup script provided, too
- Factory admins can easily add their own customization scripts (both for checks and configs)
 - Allowing Frontends to add custom scripts envisioned, but not yet implemented

Condor GCB



glideinWMS support

- **glideinWMS** developed by and for the CMS collaboration 
 - No funding to support other users
- However:
 - Having other users would bring in new ideas
 - Best-effort support will always be there for everybody
 - Collaboration with other groups welcome
 - both for development and support